



Sequence Listing

<110> Sidhu, Sachdev S.  
Weiss, Gregory A.  
Wells, James A.

<120> TRANSFORMATION EFFICIENCY IN PHAGE DISPLAY THROUGH MODIFICATION OF A COAT PROTEIN

<130> 146392004400

<140> US 09/380,447  
<141> 1999-09-01

<150> US 60/134,870  
<151> 1999-05-19

<150> US 60/133,296  
<151> 1999-05-10

<150> US 60/103,514  
<151> 1998-10-08

<150> US 60/094,291  
<151> 1998-07-27

<150> PCT/US99/16596  
<151> 1999-07-22

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1 5 10 15

Xaa Xaa

20	25	30
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Glu Thr Ala Ser Ala Gln Leu Ser Asn Phe Ala Ala Lys Ala Pro  
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Asp Asp Gly Glu Ala  
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Ala Ser Ala Thr Glu Tyr Ile Gly Tyr Ala Trp Ala Met Val Val  
           20                        25                        30

Val Ile Val Gly Ala Thr Ile Gly Ile Lys Leu Phe Lys Lys Phe  
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					5				10					15

Ala Ser Ala Thr Glu Tyr Ile Gly Tyr Ala Trp Ala Met Val Val  
           20                        25                        30

Val Ile Val Gly Ala Thr Ile Gly Ile Lys Leu Phe Lys Lys Phe  
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Val Ile Val Gly Ala Thr Ile Gly Ile Lys Leu Phe Lys Lys Phe  
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Thr Ser Lys Ala Ser  
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Ala Gln Ala Thr Glu Met Ser Gly Tyr Ala Trp Ala Leu Val Val  
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Leu Val Val Gly Ala Thr Val Gly Ile Lys Leu Phe Lys Lys Phe  
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Val Ser Arg Ala Ser

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35 40 45  
Ser Ser Lys Ala Val  
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ataaaaccgat acaattaaag gc                                         72

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					20				25					30
Tyr	Met	Leu	Leu	Val	Glu	Ala	Ser	Pro	Trp	Ala	Ala	Lys	Ala	Pro
					35				40					45
Asp	Asp	Gly	Glu	Ala										
				50										
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ggtgacgatc cc                                         112

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<210> 60

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<210> 63  
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<400> 76

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Gly Gly Arg Pro Val
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 ccatcaccat 60  
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 taaggcgcca 60  
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tcaccatgcg                                         60

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tggtggccat caccatcacc atgcg                                         75

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ttttgttttt	60
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<210> 102
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<210> 103
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      sgccggctgat gcattccca                               69

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tgctaaggcg ccagacgatg gt                                72

<210> 105
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    sgcggtgat gcattccca                                69

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<212> DNA
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cvvcvvvcvvc gatgcattcc caactatacc a                         81

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<220>
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caccatcacc atcaccatgc g                                21

<210> 109

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<220>
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<400> 109
gcctggagg agaacatcga cagcgccccc                         30

<210> 110
<211> 10
<212> PRT
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<220>
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<400> 110
Ala Trp Glu Glu Asn Ile Asp Ser Ala Pro
   1           5           10

<210> 111
<211> 30
<212> DNA
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<220>
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<210> 112
<211> 10
<212> PRT
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<220>

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<223> linker peptide

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1 5 10

<210> 113  
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<220>  
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<220>  
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Thr Gly Trp Leu Glu Gly Pro Asp Thr Pro  
1 5 10

<210> 115  
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<210> 116  
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<400> 116  
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1 5

<210> 117  
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<220>
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<400> 117
cacgactcggtcccgagcaa cggc 24

<210> 118
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<400> 118
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1 5

<210> 119
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gctgagcaac ttgcgtgcta aggccgaga cgatggtaa gctgcggctc 100
accatcacca tcaccatgct 120

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1 5 10 15

Ala Gln Leu Ser Asn Phe Ala Ala Lys Ala Pro Asp Asp Gly Glu
20 25 30

Ala Ala Ala His His His His His Ala
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Ser Ala Gln Leu Ser Asn Phe Ala Ala Lys Ala Pro Asp Asp Gly  
 20 25 30

Glu Ala Ala Ala His His His His His Ala  
 35 40

<210> 122

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<210> 123  
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Ser Val Asp Val Asp Asn Asn Trp Ile Trp Ala Val Gly Ile Ile  
 20 25 30

Glu Thr Ala Ser Ala Gln Leu Ser Asn Phe Ala Ala Lys Ala Pro  
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Asp Asp Gly Glu Ala Ala Ala Asp Ala  
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Asn Ser Gly Gly Asp

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Arg Thr Thr Ser Asn

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30

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5

10

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Ala Ser Ala Ala Asn
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cggcaccggc 60

<210> 253
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Ala Arg Gly Thr Gly
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<210> 254

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Arg Gly His Ala Pro
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caccgccagc 60

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Pro Gly Thr Ala Ser
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cggcagccac 60

<210> 259
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1 5 10 15

Ser Ser Gly Ser His
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<210> 260
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cagcggcccc 60

<210> 261
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Ala Arg Ser Gly Pro
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<210> 262
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1           5           10          15

Arg Gly Ser Asn Gly Ser Asp Ser Ser Ser
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<210> 264
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cccccacggc cacagcagcc cccgc                                75

<210> 265
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Ser His Ala Gly Asn Asp Ala Gly Arg Ala Arg Thr Asn Gly Ser
1           5           10          15

Asp Gly Pro His Gly His Ser Ser Pro Arg
20          25

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ttatgtt 57

<210> 270  
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Tyr Gly Tyr Val

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Asn Ser Phe Asp

<210> 277  
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tgttaat 57

<210> 278  
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<400> 278  
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      1           5

<210> 281
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<210> 283
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<210> 284
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Ala Ser Ala Thr Glu  
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<400> 287  
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1 5

<210> 290  
<211> 10  
<212> PRT  
<213> Artificial sequence

<220>

<223> Synthetic linker

<400> 290  
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1 5 10

<210> 291  
<211> 12  
<212> PRT  
<213> Artificial sequence

<220>

<223> Synthetic linker

<400> 291  
Gly  
1 5 10

<210> 292  
<211> 19  
<212> PRT  
<213> Artificial sequence

<220>

<223> Synthetic linker

<220>

<221> VARIANT  
<222> 4-17  
<223> where Xaa is any amino acid

<400> 292  
Gly Gly Gly Xaa  
1 5 10 15

Xaa Gly Gly

<210> 293  
<211> 4  
<212> PRT  
<213> Artificial sequence

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<220>
<223> Synthetic poly quad His tag

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His His His His
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<210> 294

<211> 50
<212> PRT
<213> M13 phage

<220>
<223> coat protein VIII

<220>
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<222> 1
<223> where Xaa is Glu, Leu, Val, Gln, Asp, Ile, Asn or Ala

<220>
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<222> 2
<223> where Xaa is Arg, His, Phe, Trp, Glu, Lys, Tyr or Asp

<220>
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<220>
<221> VARIANT
<222> 4
<223> where Xaa is Asp, Arg, His, Glu or Lys

<220>
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<222> 5
<223> where Xaa is Arg, His, Asn, Asp, Lys, Gln or Glu

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<223> where Xaa is Tyr, Trp, Ser, Ile, Leu, Phe, Thr, Val or Pro

<220>
<221> VARIANT
<222> 7
<223> where Xaa is Thr, Asn, Ser or Ala

<220>
<221> VARIANT
<222> 8
<223> where Xaa is Asp, His, Arg, Glu or Lys

<220>
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<222> 9
<223> where Xaa is Glu, Gln, Thr, Asp, Asn, Ser or Ala

<220>
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<222> 11
<223> where Xaa is Trp, Ile, Val, Tyr, Leu or Phe

<220>
<221> VARIANT
<222> 12
<223> where Xaa is Arg, His, Asn, Glu, Asp, Lys or Gln

<220>
<221> VARIANT
<222> 13
<223> where Xaa is Ile, Leu, Glu, Gln, Ala, Val, Asp, Thr, Asn or Ser

<220>
<221> VARIANT
<222> 14
<223> where Xaa is Leu, Ile or Val

<220>
<221> VARIANT
<222> 15
<223> where Xaa is Asp, Arg, Asn, Glu, Lys, His or Gln

<220>
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<222> 16
<223> where Xaa is Glu, Val, Leu, Phe, Asp, Ile, Ala, Ser or Gly

<220>
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<222> 17
<223> where Xaa is Glu, Val, Leu, Ile, Ala, Thr, Asp or Ser

<220>
<221> VARIANT
<222> 18
<223> where Xaa is Leu, Val, Ile or Ala

<220>
<221> VARIANT
<222> 19
<223> where Xaa is Leu, Thr, Gln, Glu, Ile, Val, Ser, Ala, Asn or Asp

<220>
<221> VARIANT
<222> 20
<223> where Xaa is Arg, Asp, His, Asn, Gln, Lys or Glu

<220>
<221> VARIANT
<222> 21
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<223> where Xaa is Trp, Tyr, Ile, Leu, Phe or Val

<220>
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<222> 22
<223> where Xaa is Trp, Phe, Tyr or Ile

<220>
<221> VARIANT
<222> 23
<223> where Xaa is Trp, Tyr, Ile, Val, His, Lys, Phe, Leu, Arg or Gly

<220>
<221> VARIANT
<222> 24
<223> where Xaa is Ile, Gln, Leu, Asn, Val or Tyr

<220>
<221> VARIANT
<222> 25
<223> where Xaa is Ser, Leu, Ile, Thr, Val or Ala

<220>
<221> VARIANT
<222> 26
<223> where Xaa is Ala, Ile, Val, Gly, Leu, Met or Trp

<220>
<221> VARIANT
<222> 27
<223> where Xaa is Asn, Thr, Ser or Ala

<220>
<221> VARIANT
<222> 28
<223> where Xaa is Ile, Leu, Val or Met

<220>
<221> VARIANT
<222> 29
<223> where Xaa is Lys, Arg, Phe, Trp, His, Tyr or Val

<220>
<221> VARIANT
<222> 30
<223> where Xaa is Ile, Val or Leu

<400> 294
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Ala Xaa Xaa Xaa Xaa Xaa Xaa
    1           5           10          15
Xaa Val Ile
    20          25          30
Val Gly Ala Thr Ile Gly Ile Lys Leu Phe Lys Lys Phe Thr Ser Lys
    35          40          45
Ala Ser
    50

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<210> 295  
 <211> 50  
 <212> PRT  
 <213> M13 phage  
 <220>  
 <223> coat protein VIII  
 <220>  
 <221> VARIANT  
 <222> 1  
 <223> where Xaa is any amino acid except Ala  
 <220>  
 <221> VARIANT  
 <222> 2  
 <223> where Xaa is any amino acid except Glu  
 <220>  
 <221> VARIANT  
 <222> 3  
 <223> where Xaa is any amino acid except Gly  
 <220>  
 <221> VARIANT  
 <222> 4  
 <223> where Xaa is any amino acid except Asp  
 <220>  
 <221> VARIANT  
 <222> 5  
 <223> where Xaa is any amino acid except Asp  
 <220>  
 <221> VARIANT  
 <222> 6  
 <223> where Xaa is any amino acid except Pro  
 <220>  
 <221> VARIANT  
 <222> 8  
 <223> where Xaa is any amino acid except Lys  
 <220>  
 <221> VARIANT  
 <222> 9  
 <223> where Xaa is any amino acid except Ala  
 <400> 295  
 Xaa Xaa Xaa Xaa Xaa Ala Xaa Xaa Ala Phe Asn Ser Leu Gln Ala  
   1               5               10               15  
 Ser Ala Thr Glu Tyr Ile Gly Tyr Ala Trp Ala Met Val Val Val Ile  
   20               25               30  
 Val Gly Ala Thr Ile Gly Ile Lys Leu Phe Lys Lys Phe Thr Ser Lys  
   35               40               45

Ala Ser  
 50

<210> 296

<211> 50  
 <212> PRT  
 <213> M13 phage

<220>  
 <223> coat protein VIII

<220>  
 <221> VARIANT  
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 <223> where Xaa is any amino acid except Phe

<220>  
 <221> VARIANT  
 <222> 12  
 <223> where Xaa is any amino acid except Asn

<220>  
 <221> VARIANT  
 <222> 13  
 <223> where Xaa is any amino acid except Ser

<220>  
 <221> VARIANT  
 <222> 15  
 <223> where Xaa is any amino acid except Gln

<220>  
 <221> VARIANT  
 <222> 16  
 <223> where Xaa is any amino acid except Ala

<220>  
 <221> VARIANT  
 <222> 17  
 <223> where Xaa is any amino acid except Ser

<220>  
 <221> VARIANT  
 <222> 20  
 <223> where Xaa is any amino acid except Glu

<400> 296

Ala	Glu	Gly	Asp	Asp	Pro	Ala	Lys	Ala	Ala	Xaa	Xaa	Xaa	Xaa	Xaa	
1														15	
Xaa	Ala	Thr	Xaa	Tyr	Ile	Gly	Tyr	Ala	Trp	Ala	Met	Val	Val	Ile	
														30	
Val	Gly	Ala	Thr	Ile	Gly	Ile	Lys	Leu	Phe	Lys	Lys	Phe	Thr	Ser	Lys
														45	
35						40									

Ala Ser  
 50

<210> 297

<211> 50  
<212> PRT  
<213> M13 phage

<220>  
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<220>  
<221> VARIANT  
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<223> where Xaa is any amino acid except Ile

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<222> 23  
<223> where Xaa is any amino acid except Gly

<220>  
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<222> 24  
<223> where Xaa is any amino acid except Tyr

<220>  
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<222> 25  
<223> where Xaa is any amino acid except Ala

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<222> 26  
<223> where Xaa is any amino acid except Trp

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<222> 27  
<223> where Xaa is any amino acid except Ala

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<222> 28  
<223> where Xaa is any amino acid except Met

<220>  
<221> VARIANT  
<222> 29  
<223> where Xaa is any amino acid except Val

<220>  
<221> VARIANT  
<222> 30

<223> where Xaa is any amino acid except Val

<400> 297  
Ala Glu Gly Asp Asp Pro Ala Lys Ala Ala Phe Asn Ser Leu Gln Ala  
1 5 10 15  
Ser Ala Thr Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Val Ile  
20 25 30  
Val Gly Ala Thr Ile Gly Ile Lys Leu Phe Lys Lys Phe Thr Ser Lys  
35 40 45

Ala Ser  
50

<210> 298

<211> 50  
<212> PRT  
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<220>  
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<220>  
<221> VARIANT  
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<220>  
<221> VARIANT  
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<223> where Xaa is any amino acid except Glu

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<223> where Xaa is any amino acid except Gly

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<223> where Xaa is any amino acid except Asp

<220>  
<221> VARIANT  
<222> 5  
<223> where Xaa is any amino acid except Asp

<220>  
<221> VARIANT  
<222> 6  
<223> where Xaa is any amino acid except Pro

<220>  
<221> VARIANT  
<222> 8  
<223> where Xaa is any amino acid except Lys

<220>

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<221> VARIANT
<222> 9
<223> where Xaa is any amino acid except Ala

<220>
<221> VARIANT
<222> 11
<223> where Xaa is any amino acid except Phe

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<222> 12
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<220>
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<222> 13
<223> where Xaa is any amino acid except Ser

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<222> 17
<223> where Xaa is any amino acid except Ser

<220>
<221> VARIANT
<222> 20
<223> where Xaa is any amino acid except Glu

<400> 298
Xaa Xaa Xaa Xaa Xaa Ala Xaa Xaa Ala Xaa Xaa Xaa Leu Xaa Xaa
 1           5           10          15
Xaa Ala Thr Xaa Tyr Ile Gly Tyr Ala Trp Ala Met Val Val Val Ile
 20          25          30
Val Gly Ala Thr Ile Gly Ile Lys Leu Phe Lys Lys Phe Thr Ser Lys
 35          40          45
Ala Ser
 50

<210> 299

<211> 50
<212> PRT
<213> M13 phage

<220>
<223> coat protein VIII

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<220>
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<222> 11
<223> where Xaa is any amino acid except Phe

<220>
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<222> 12
<223> where Xaa is any amino acid except Asn

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<223> where Xaa is any amino acid except Ser

<220>
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<223> where Xaa is any amino acid except Gln

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<222> 16
<223> where Xaa is any amino acid except Ala

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<223> where Xaa is any amino acid except Ser

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<222> 21
<223> where Xaa is any amino acid except Tyr

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<222> 22
<223> where Xaa is any amino acid except Ile

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<223> where Xaa is any amino acid except Gly

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<221> VARIANT
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<223> where Xaa is any amino acid except Ala

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<223> where Xaa is any amino acid except Trp

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<223> where Xaa is any amino acid except Val

<220>
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<222> 30
<223> where Xaa is any amino acid except Val

<400> 299
Ala Glu Gly Asp Asp Pro Ala Lys Ala Ala Xaa Xaa Xaa Leu Xaa Xaa
 1           5           10          15
Xaa Ala Thr Xaa Val Ile
 20          25          30
Val Gly Ala Thr Ile Gly Ile Lys Leu Phe Lys Lys Phe Thr Ser Lys
 35          40          45
Ala Ser
 50

<210> 300

<211> 50
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<220>
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<220>
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<222> 1
<223> where Xaa is any amino acid except Ala

<220>
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<222> 2
<223> where Xaa is any amino acid except Glu

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<223> where Xaa is any amino acid except Gly

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<223> where Xaa is any amino acid except Asp

<220>
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<222> 5
<223> where Xaa is any amino acid except Asp

<220>
<221> VARIANT
<222> 6
<223> where Xaa is any amino acid except Pro

<220>
<221> VARIANT
<222> 8
<223> where Xaa is any amino acid except Lys

<220>
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<222> 9
<223> where Xaa is any amino acid except Ala

<220>
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<222> 11
<223> where Xaa is any amino acid except Phe

<220>
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<223> where Xaa is any amino acid except Gln

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<223> where Xaa is any amino acid except Ala

<220>
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<221> VARIANT
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<223> where Xaa is any amino acid except Ala

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<223> where Xaa is any amino acid except Trp

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<222> 28
<223> where Xaa is any amino acid except Met

<220>
<221> VARIANT
<222> 29
<223> where Xaa is any amino acid except Val

<220>
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<223> where Xaa is any amino acid except Val

<400> 300